

## ABSTRACT

A system for determining the instantaneous amplitude ( $a$ ) and phase ( $\phi$ ) of an analog sinusoid includes a sensor which produces the analog sinusoid output in response to the measurement of a parameter, an analog-to-digital converter which receives the analog sinusoid from the sensor and converts the analog sinusoid to a digital sinusoid, a delay device which receives the digital sinusoid and produces an in-phase signal (I) associated with the digital sinusoid, a transformer which receives the digital sinusoid and produces a quadrature signal (Q) associated with the digital sinusoid by introducing a phase shift plus a delay to the digital sinusoid, an amplitude computation device which receives the in-phase (I) and quadrature (Q) signals and computes the instantaneous amplitude ( $a$ ) of the digital sinusoid by processing the in-phase (I) and quadrature (Q) signals according to the equation  $a = \sqrt{Q^2 + I^2}$  and a phase computation device which receives the in-phase (I) and quadrature (Q) signals and computes the instantaneous phase ( $\phi$ ) of the digital sinusoid by processing the in-phase (I) and quadrature (Q) signals according to the equation  $\phi = \tan^{-1}(Q/I)$ .